7. $\int_1^{e^2} \frac{x^3+1}{x}\,dx$

$\int_1^{e^2} \frac{x^3}{x} + \frac{1}{x}\,dx$

$\int \frac{x}{x^3+1}\,dx$

Mar 5-8:55 AM

11. $\int_b^a f''(x)\,dx$ $\quad 0 < a < b$

$\int_b^a 0\,dx = ?$

f is linear

$f = mx + b$

$f'' = 0$

$K\Big|_b^a = K - K = 0$

$C\Big|_b^a = C - C = 0$

Mar 5-9:31 AM

Review 4 parametric, polar, vector functions

Intermediate value theorem
extreme value theorem

parametric $x = f(t)$, $y = g(t)$ sometimes t is time

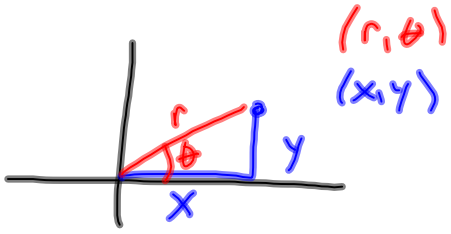
$x = 4\cos(\pi t)$
$y = 5\sin(\pi t)$

find the position at $t=2$
describe the path of the particle

$(4,0)$ ellipse

Mar 5-9:36 AM

polar



$y = r\sin\theta$
$x = r\cos\theta$

$r = \sqrt{x^2+y^2}$

$\theta = \tan^{-1}\frac{y}{x}$ only works in QI, QIV

if in QII or QIII add π

Mar 5-9:44 AM

$r = k$ circle radius k

$r = a\sin(n\theta)$
$r = a\cos(n\theta)$ rose

n odd n leaves
n even $2n$ leaves

$r = a + b\sin\theta$ cardioid if $a = b$
$r = a + b\cos\theta$ limacon with loop $b > a$
limacon with dimple $b < a$

Mar 5-9:46 AM

$r = 1 + \cos\theta$
$r = 1 - \cos\theta$

both go thru $(0,0)$ but not at the same time

$r = \sin\theta$
$r = \cos\theta$ find the intersections

$\sin\theta = \cos\theta$ $\theta = \frac{\pi}{4}$ $r = \frac{\sqrt{2}}{2}$

Mar 5-9:50 AM

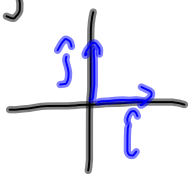
vector functions

graph (use parametric)

$\hat{r}(t) = \langle \cos(\pi t), (t-1) \rangle = \cos(\pi t)\hat{i} + (t-1)\hat{j}$

$\hat{r}(2) = \langle \cos 2\pi, 2-1 \rangle$

$= \langle 1, 1 \rangle = \hat{i} + \hat{j}$

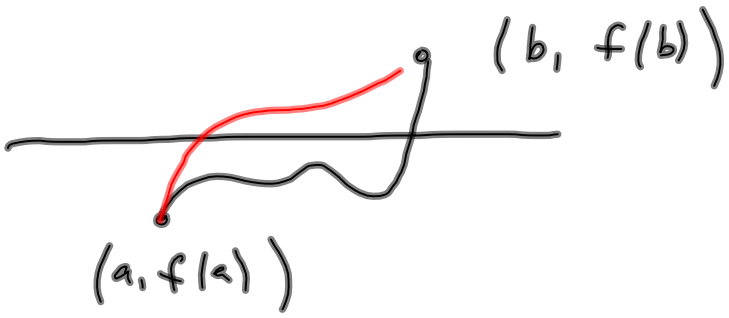


$\hat{v} = \langle a, b \rangle$

$= a\hat{i} + b\hat{j}$

Mar 5-10:03 AM

Intermediate value theorem



extreme value theorem

continuous function has max & min on a closed interval

Mar 5-10:10 AM